Amendments to the Claims

The following is a complete listing of the pending claims and will replace all prior versions and listings of claims in the application.

1. (original) An injection molding apparatus comprising:

a manifold for receiving a melt stream of moldable material;

at least one nozzle fluidly connected to the manifold for receiving the melt stream;

a valve pin extending through a melt channel of the injection molding apparatus, the valve pin being axially movable for controlling the flow of the melt stream within the melt channel; and

at least one pressure sensor coupled to the valve pin and axially movable therewith.

2. (original) The injection molding apparatus of claim 1, wherein at any axial position of the valve pin the pressure sensor measures a pressure of the melt.

3. (original) The injection molding apparatus of claim 1, further comprising:

a controller for communicating with the pressure sensor.

4. (original) The injection molding apparatus of claim 2, further comprising:

a mold cavity in fluid communication with the nozzle via a respective mold gate, wherein the valve pin has an end portion for selectively opening and closing the mold gate.

5. (original) The injection molding apparatus of claim 2, wherein the valve pin has an end portion positioned within a nozzle melt channel for controlling the flow of the melt stream therein.

6. (original) The injection molding apparatus of claim 2, wherein the valve pin has an end portion positioned within a manifold melt channel for controlling the flow of the melt stream therein.

7. (original) The injection molding apparatus of claim 1, wherein an internal passage extends through the valve pin to receive the pressure sensor.

8. (original) The injection molding apparatus of claim 1, wherein the pressure sensor has a melt contacting surface that is flush with an end surface of the valve pin.

9. (original) The injection molding apparatus of claim 1, wherein the pressure sensor has a melt contacting surface that is downstream of an end surface of the valve pin.

10. (original) The injection molding apparatus of claim 2, further comprising:

a mold cavity in fluid communication with at least two nozzles via respective mold gates.

11. (original) The injection molding apparatus of claim 2, wherein the nozzle includes a plurality of melt channels such that each melt channel receives a separate melt stream of moldable material.

12. (original) The injection molding apparatus of claim 1, further comprising:

at least one thermocouple coupled to the valve pin and axially movable therewith.

13. (original) The injection molding apparatus of claim 1, further comprising:

at least one thermocouple coupled to the nozzle.

14. (original) The injection molding apparatus of claim 12, further comprising:

at least one thermocouple coupled to the nozzle.

15. (original) The injection molding apparatus of claim 5, further comprising:

at least one thermocouple coupled to the valve pin and axially movable therewith.

16. (original) The injection molding apparatus of claim 5, further comprising:

at least one thermocouple coupled to the nozzle.

17. (original) The injection molding apparatus of claim 15, further comprising:

at least one thermocouple coupled to the nozzle.

18. (currently amended) A method of detecting at least one processing condition in an injection molding apparatus, comprising:

providing an axially movable valve pin that extends through a melt channel of the apparatus, wherein the valve pin includes at least one processing sensor coupled to [[a]] the valve pin and axially movable therewith;

injecting a melt stream into a mold cavity via the melt channel;

sensing at least a pressure of the melt stream via the processing sensor; and

sending the sensed information to a controller.

19. (original) The method of claim 18, wherein the processing sensor is a pressure sensor and pressure information is measured in any axial position of the valve pin.

20. (original) The method of claim 18, wherein the processing sensor is a pressure sensor and pressure information is measured continuously as the valve pin moves between a retracted position and an extended position.

21. (original) The method of claim 18, wherein the processing sensor is a pressure sensor and a temperature sensor such that information from each sensor may be communicated to a controller in any axial position of the valve pin.

22. (original) The method of claim 21, further comprising:

providing a nozzle having a nozzle melt channel in fluid communication with the mold cavity; and positioning the valve pin in the nozzle melt channel such that the pressure sensor and the temperature sensor sense processing conditions of the melt stream in the nozzle melt channel.

23. (original) The method of claim 22, further comprising:

providing a thermocouple on the nozzle for measuring a temperature proximate of a nozzle heater.

24. (original) A method of controlling an injection molding process through an injection molding manifold comprising:

locating a pressure sensor in a melt channel of the manifold;

moving said pressure sensor along an axis of the manifold melt channel to detect a melt pressure in at least two locations along the manifold melt channel.

25. (original) The method of claim 24, further comprising:

providing a nozzle fluidly connected to the manifold wherein the pressure sensor measures the pressure of the melt flowing towards the nozzle

26. (original) The method of claim 24, wherein the pressure sensor is attached to a movable valve pin that controls the amount of flow through the manifold melt channel.

27. (original) The method of claim 26, further comprising:

providing a process controller in communication with the pressure sensor wherein the process controller transforms pressure information into movement or location control of an actuator linked to the movable valve pin.

28. (currently amended) The method of claim 26 [[24]], further comprising:
providing a temperature sensor attached to the movable valve pin.